REMARKS

The Office has rejected the claims of the application under 35 U.S.C. § 103(a) as being unpatentable over WO 01/31720 in view of Odaohhara et al., U.S. Patent Application Publication No. 2002/0144160 ("Odaohhara"). The Office is using Fujimoto at al., U.S. Patent No. 7,195,842 ("Fujimoto") as an English language equivalent of WO 01/31720.

Claim 1 of the present application recites:

> A method of charging and discharging a lithium secondary battery which includes a negative electrode having an active material layer including silicon provided on a current collector comprising a metal which does not form an alloy with lithium, comprising charging and discharging the battery within a range of state of charge (SOC) where no peak corresponding to a compound of silicon and lithium is observed in an X-ray diffraction pattern of the negative electrode during charging using CuK_{α}-radiation as the X-ray source.

Claims 1-16 depend directly or indirectly on claim 1 and limit various of the limitations of the method of claim 1.

The Office has cited Fujimoto as disclosing a lithium secondary battery which meets each of the limitations of the lithium battery that is the subject of the method recited in claims 1-16. Odaohhara is cited as teaching a method of charging and discharging lithium ion batteries such that the battery is only partially discharged before it is subsequently charged. The Office

states that Odaohhara recognizes that by only partially discharging the battery and then subsequently charging the battery as opposed to fully discharging the battery and then subsequently charging the battery, the battery will retain a higher discharge capacity over the cycle life. The Office further alleges that the best conditions for a partial discharge are a 30% discharge and a 50% discharge.

The Office states that it is its understanding that charging and discharging of a battery within a range of state of charge (SOC) as described and claimed in the present application is that the battery is partially discharged before charging as described in Odaohhara. Based on this understanding, the position of the Office is that it would have been obvious to apply the method of Odaohhara to the battery of Fujimoto and that a silicon lithium compound will not be formed.

Applicants respectfully submit that the Office's understanding of the meaning of SOC is not correct. The method of Odaohhara has no relationship to the method of the present invention in which the lithium secondary battery is charged and discharged within a range of state of charge (SOC) where no peak corresponding to a compound of silicon and lithium is observed in an X-ray diffraction pattern

of the negative electrode during charging using CuK_α-radiation as the X-ray source.

State of Charge of a battery is generally defined as the available, or remaining, capacity of the battery expressed as a percentage of its rated, or nominal, capacity. (See, for example, U.S. Patent No. 6,300,763, Cols. 1 and 2, and www.mpoweruk.com/soc.htm. Therefore, "charging and discharging the battery within a range of state of charge (SOC) where no peak corresponding to a compound of silicon and lithium is observed in an X-ray diffraction pattern of the negative electrode during charging using CuK_α-radiation as the X-ray source" as recited in claim 1 (emphasis added) means that the battery is charged to a certain percentage less than 100% of its capacity and is then discharged by 100%.

It is also believed to be clear from the specification disclosure that charging and discharging of a battery within a range of state of charge (SOC) as described and claimed in the present application means the extent of charging - not discharging. For example, paragraph [0027] describes using a battery charger "which controls a charge ending voltage of the battery to that which limits charging ..." and Table 1 describes the potential at "End of Charge."

In Odaohhara, on the other hand, as noted in the Action, a battery is charged by 100% and is then discharged to a certain percentage less than 100%.

Fig. 1 and the data of Table 1 of the present application show that when a battery is charged over a certain percentage, a silicon lithium compound is formed. Therefore, applying the method of Odaohhara in which a battery is charged by 100% to a battery as recited in claim 1 of the present application will result in the formation of a silicon lithium compound.

The proposed combination of WO 01/31720 and Odaohhara will not result in the method of the present invention. The 35 U.S.C. § 103(a) rejection is improper and should be removed.

The foregoing is believed to be a complete and proper response to the Office Action dated April 14, 2008, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,
KUBOVCIK & KUBOVCIK

Ronald J. Kubovcik
Reg. No. 25,401

Atty. Case No. SNY-053
Crystal Gateway 3
Suite 1105
1215 South Clark Street
Arlington, VA 22202
Tel: (703) 412-9494
Fax: (703) 412-9345
RJK/esc